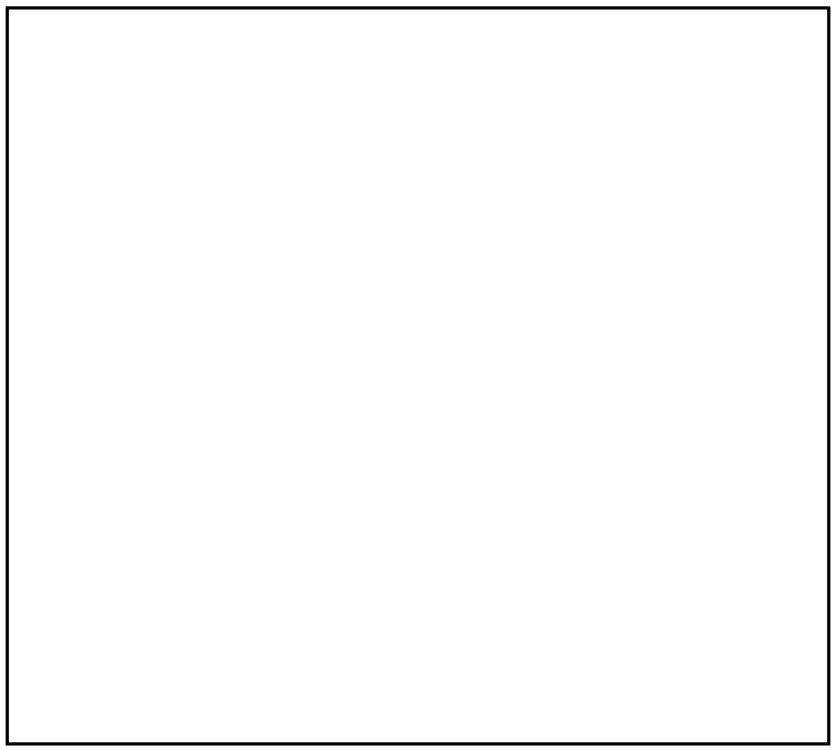
Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

STAT



Declass Review by
NIMA/DOD

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

R-103-68

PROGRESS REPORT NO. 1
ADVANCED LIGHT TABLE

Report Period: 24 June 1968 to 31 July 1968

Contract [redacted] STAT

31 July 1968

[redacted] STAT

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

1. OBJECTIVES

The Advanced Light Table to be designed and developed under Contract [redacted] will meet the following objectives:

1) Table-top viewer with advanced features for film in widths from 70mm to 9-1/2 inches

2) Simplified transport system with quick switching from motor-drive to manual mode

3) Light-weight design for portability

4) Operation in both horizontal and vertical modes of film travel

5) Low cost due to a minimum number of parts and extensive use of sheet-metal construction

6) Quiet operation to eliminate operator disturbance

7) Practical human factors design to permit the table to be used for extended periods by an operator in comfortable viewing positions

2. SUMMARY OF PROGRESS

Design and development of the Advanced Light Table were initiated during the report interval. An apparent change in scope of effort was resolved by a sponsor-approved return to the original concept, and the program was re-scheduled so that the 7-month delivery period would start from 22 July 1968. Significant design parameters were defined in a human factors conference with a sponsor specialist. A rough wooden model was constructed and utilized in a human factors study. Near the end of the report interval, layout drawings were prepared and construction of an operational breadboard was started. Based on the new delivery schedule, the project was considered to be approximately 3 percent complete at the end of the report interval.

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

3. ACTIVITY DURING REPORT INTERVAL

3.1 Initial Effort

The contract as released on 24 June 1968 included a change of scope from Proposal No. 18-27686-09 as originally submitted by [redacted] STAT

STAT [redacted]. The change was in the paragraph 2.3, Film Transport System, which states that "The system shall accommodate 5-1/2 inch wide film, 1000 feet in length", and "The system shall accommodate 9-1/2 inch wide film, 500 feet in length."

The original concept included 5-1/2 inch wide film, 500 feet in length. The change to a 1000-foot length not only increased the spool size from 7.6 inches to 10.5 inches in diameter but affected many areas of the light table design. To determine the significant areas that would be affected by this change, the following work was accomplised:

1) A layout drawing was generated to accommodate the increased reel size.

2) A model drawing was made to permit the construction of a fairly accurate wooden prototype.

3) Torque requirements were investigated for the larger reel size. Manufacturers of drive motors were contacted to review the availability of larger motors and to investigate the effect upon the case design for accommodating these larger motors.

3.2 Human Factors Conference

STAT On 17 July 1968, [redacted] Human Factors Specialist for the project sponsor, visited the [redacted] facility. An all-day STAT conference was held with the [redacted] engineering and marketing STAT representatives concerned with the project. The human factors problems

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

involved in the use of the light table were discussed. [redacted] explained that the table would be used equally in both the horizontal and vertical positions by operators in a seated position. The operators of the machine would have to be comfortably seated because it would be used for periods of up to 8 hours at a time. STAT

Various rough mock-ups were studied showing the relation between the 1000-foot spool and the viewing surface of the light table. It was determined that the operator in a seated position and looking down at a 15-degree angle, which is the normal viewing position, could only see the lower 4 inches of the illuminated portion of the table. Sufficient clearance between the operator's legs and the lower takeup spool when the table is in vertical position would have to be designed into the table.

The conclusions drawn were that the light table, when used with a 1000-foot spool, would have to be mounted on a special viewing stand which would allow the spool to be slung underneath the table. This requirement would preclude the use of the light table on any ordinary desk or office-type table when in the vertical position.

3.3 Wooden Model

To explore the various component mounting aspects of the light table, a rough wooden model was built to hold the spools in correct relation to the film viewing area. This rough wooden model, which was completed two days after [redacted] visit, served to point out the impact of incorporating such a large spool of film on a small light table of the portable type. STAT

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

3.4 Reversion to Original Concept

On 19 July 1968, [redacted] was officially notified that STAT the sponsor was withdrawing the requirement for 1000-foot spool of 5-1/2 inch film. The program was re-scheduled so that the 7-month delivery period would start from 22 July 1968. All the work done up to that point was on the requested contract change.

A new layout was created to tie in some of the design concepts that were generated in the 1000-foot spool layout and incorporate these back into a 500-foot spool light table.

The rough wooden model was then reconstructed to agree with the dimensions on the new layout and a human factors study was done on the use of the light table.

3.5 Human Factors Study

Table 1 lists the average dimensions for a variety of body sizes for both male and female operators. These measurements were taken in conjunction with the rough wooden light table model. The dimensions shown agree with the normal dimensions given in the book "The Measure of Man", by Henry Dreyfuss.

Photographs 8300, 8301, and 8302 are three views of a female operator to illustrate the following dimensional information in conjunction with Drawing 12017-10:

Operator height	-	5 feet 9-1/2 inches
Eye Level to Floor (A)	-	44 inches (slump position)
Chair Height (B)	-	17 inches
Desk Height (C)	-	30 inches
Eye to Glass (D)	-	12 inches
Leg Clearance (E)	-	2 inches
Viewing Spot (G)	-	2 inches above centerline

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

TABLE 1

AVERAGE DIMENSIONS OF MALE AND FEMALE OPERATORS

Operator	(1) Chair Seat to Eye Center	(2) Slump	(3) Compressed Seat Height	(4) Eye Level to Floor*
Male	29 in. for Lower 95% 31 in. for Normal 80% 34 in. for Higher 95%	2 in. Normal	17 in. for 80% 16 to 18 in. for 95%	46 in. Normal
Female	26.3 in. for Lower 95% 28.8 in. for Normal 80% 30.2 in. for Higher 95%	2 in. Normal	16 in. for 80% 15 to 17 in. for 95%	43 in. Normal
* (1) - (2) + (3) = (4)				

The most important aspects of the use of the table involve the clearance between the operator's lap or thighs and the film spool, and the relation of the operator's normal viewing position to the film viewing area. With this particular operator, the lap clearance is approximately 2 inches and her eyes are looking at approximately the center of the viewing area. In the photographs, the wooden model is sitting on a table 30 inches high, and the operator is seated on a chair 17 inches high. Since the photographs were taken, the light box has been moved up 1 inch to permit the same lap clearance from a 29-inch desk, which is a standard height.

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

3.6 Layout Drawing

Drawing 12017-11 shows the significant dimensions of the light table and the maximum angle to which the light box may be elevated in its vertical position. The overall height of the light box and base is now 9-1/2 inches which is the minimum height that can be used with the type of motor selected for the spool drive. This motor is a torque motor of the printed circuit type, similar to other motors used in [ ] STAT line of standard light tables but smaller in size. The dimensions shown are considered final and provide a satisfactory human engineering approach with a reasonable manufacturing cost.

3.7 Operational Breadboard

Drawing 12017-3 shows the layout of the reel motor and manual drive mechanisms. The breadboard is presently under construction. This flat plate layout will prove the entire electromechanical control system of the light table. The controls will include the electronic circuits necessary to operate the spool drive motors and clutches.

3.8 Percentage Completion

It is estimated that approximately 3 percent of the project has been completed as of 31 July 1968.

4. PROGRAM FOR NEXT INTERVAL

The following activity is scheduled for the coming month:

1) An accurate wooden model of the light table will be constructed for final proving of the dimensions and the human factors involved. It is suggested that a cognizant representative from the project sponsor make a visit to the [ ] STAT facility to see this wooden model.

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

2) The operational breadboard will be started, and the exact sizes of all the components will be determined for packaging in the unit, including the electronic packaging in the base of the unit.

3) An experimental light grid and associated transformers and controls will be obtained. A detailed study will be made of the lamp dimming problem, and dimming circuits will be constructed in prototype fashion.

4) The detailed design of the elevating device will be completed and the parts will be obtained for trail and evaluation.

5) A detailed layout of the lamp box assembly and spool holder assemblies will be made.

STAT 6) The [redacted] facility will be closed for vacation 16 August through 3 September.

5. UNRESOLVED PROBLEM AREAS

5.1 Motor Drive

The correct ratio between the torque motors and the output spool must be determined to obtain the most rapid rewind time possible without any tendency of throwing film loops when the controls are rapidly flipped from forward to reverse. The design goal in this area is to make the control foolproof from any operator handling condition.

5.2 Light Grid Dimming

The problem in this area is to determine the exact level to which the grid can be reliably dimmed, considering all the variables that might be obtained in the components.

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

5.3 Elevation Device

In the elevation device, the problem is to design a gear system or gear-and-belt system that will operate easily with little backlash and that will be capable of having a manual override for operation without power. The elevator will include some version of a worm wheel-and-gear design, probably driven by a timing belt which will synchronize the two worm gears.

6. ORAL AGREEMENTS ON TECHNICAL MATTERS

There are no outstanding oral agreements which require resolution.

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

ILLUSTRATIONS

Photographs 8300, 8301, and 8302 Showing Female Operator and Wooden Model of Advanced Light Table

Anthropometric Data - Adult Male Seated at Console

Anthropometric Data - Adult Female Seated at Console

Drawing 12017-3, Advanced Light Table, Breadboard Drive System

Drawing 12017-10, Advanced Light Table, Human Factors Data

Drawing 12017-11, Advanced Light Table Assembly

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

STAT

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

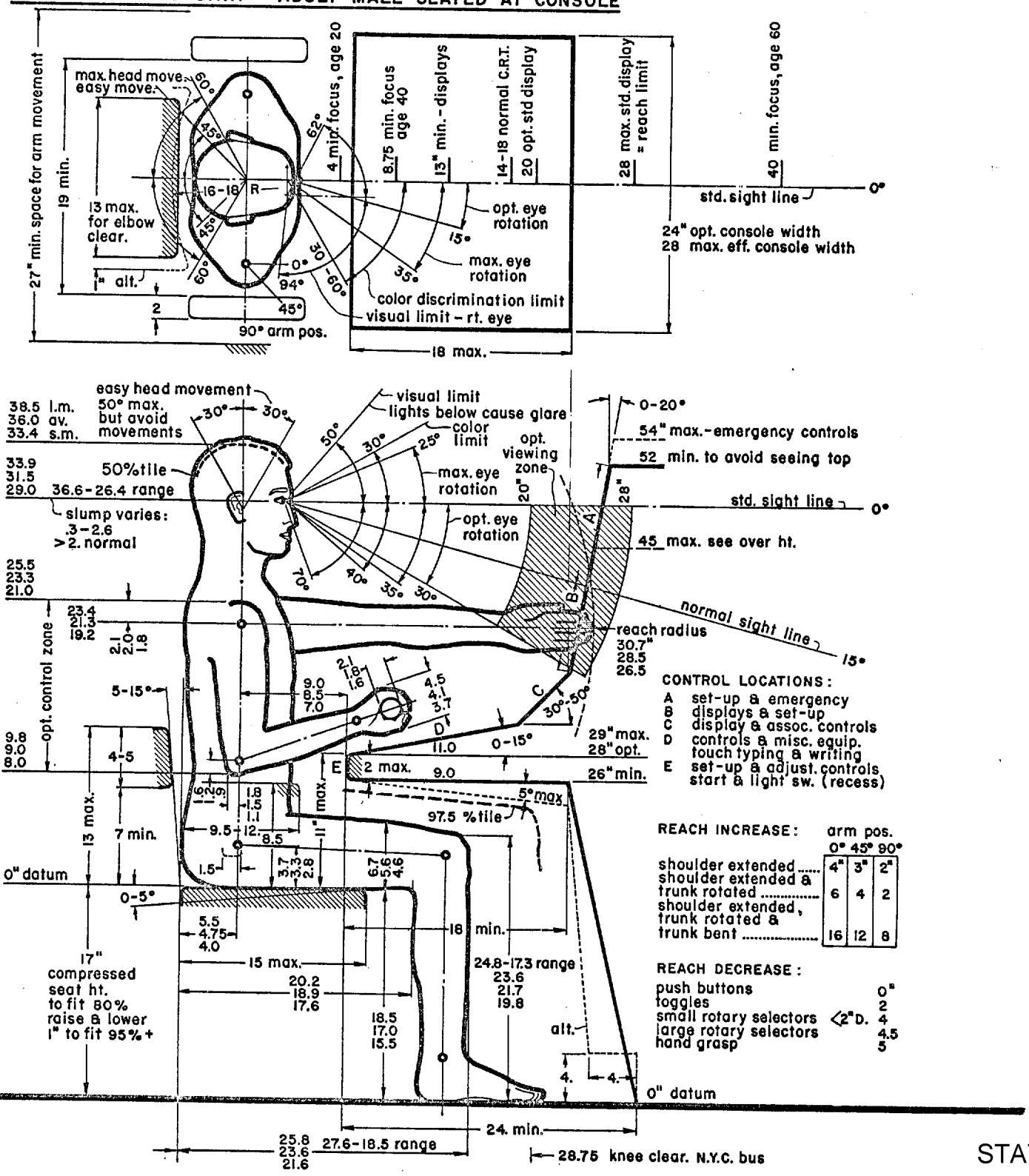
Next 5 Page(s) In Document Exempt

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

STAT

ANTHROPOMETRIC DATA — ADULT MALE SEATED AT CONSOLE



6.6-9.% left handed, 3.5-6.% color blind. 4.5% hard of hearing

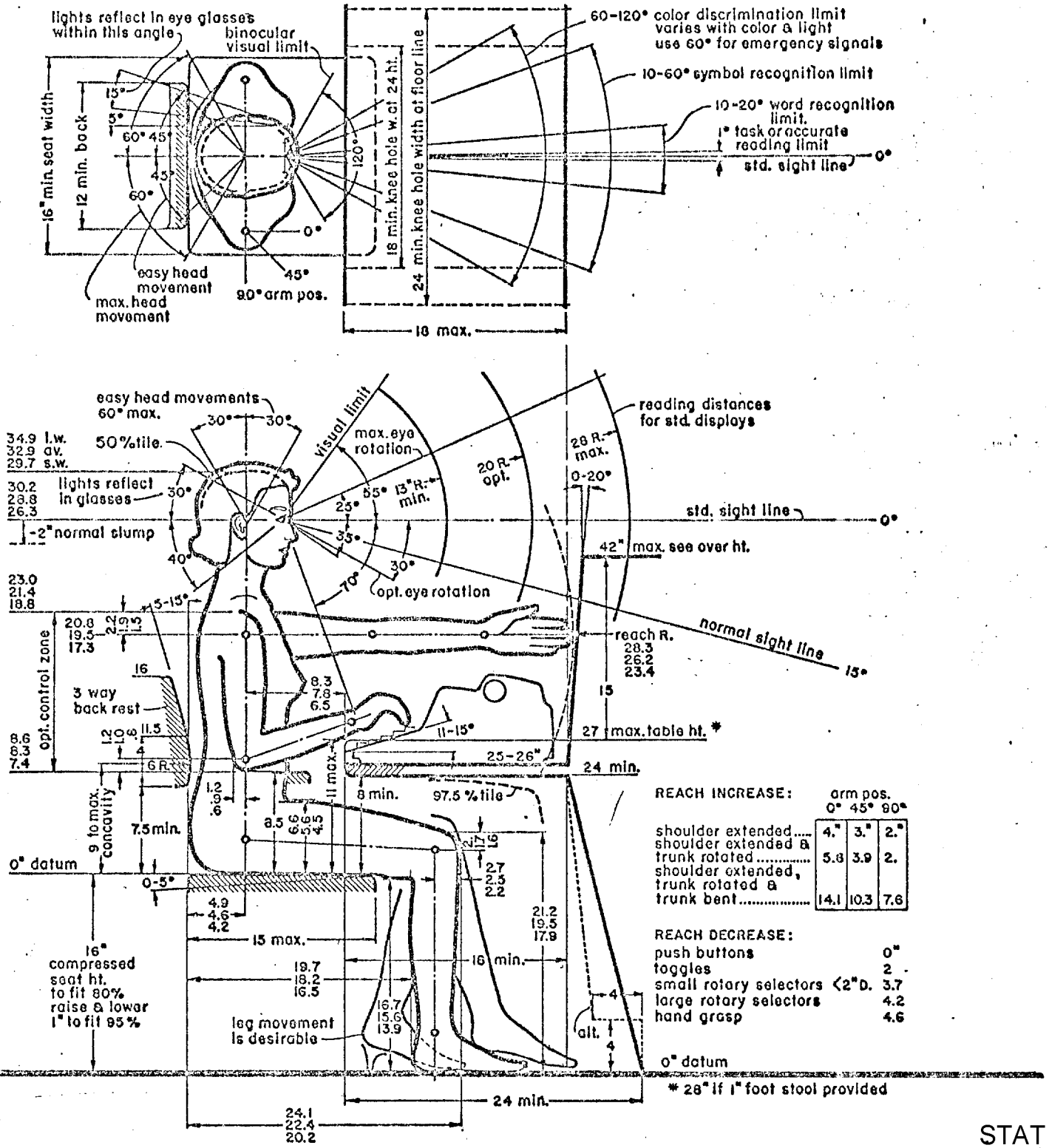
STAT

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

STAT

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

ANTHROPOMETRIC DATA — ADULT FEMALE SEATED AT CONSOLE



arm pos.	0°	45°	90°
shoulder extended	4."	3."	2."
shoulder extended & trunk rotated	5.8	3.9	2.
shoulder extended, trunk rotated & trunk bent	14.1	10.3	7.6

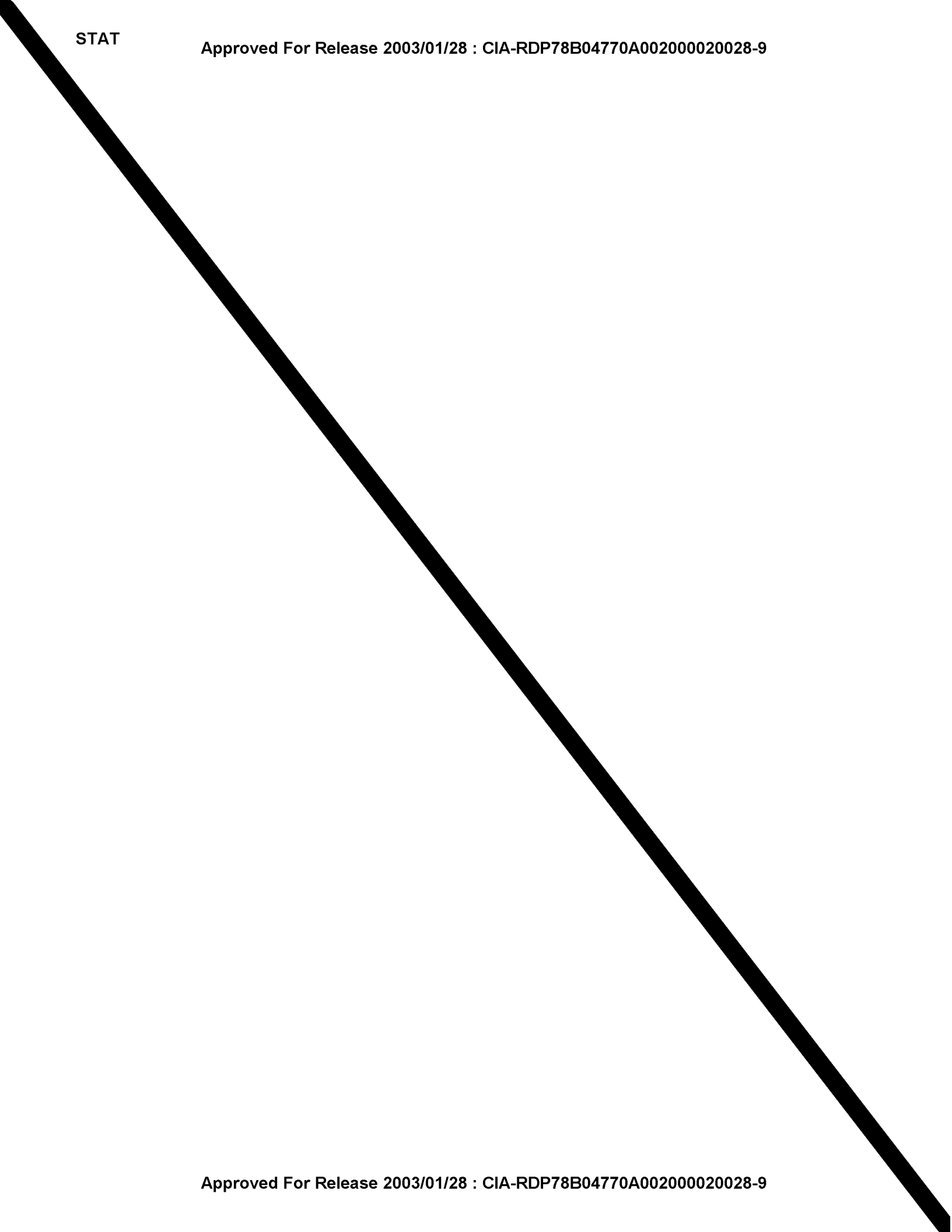
6.6-7.% left handed, 3.5-6.% color blind, 4.5% hard of hearing, 37.9% wear glasses

STAT

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

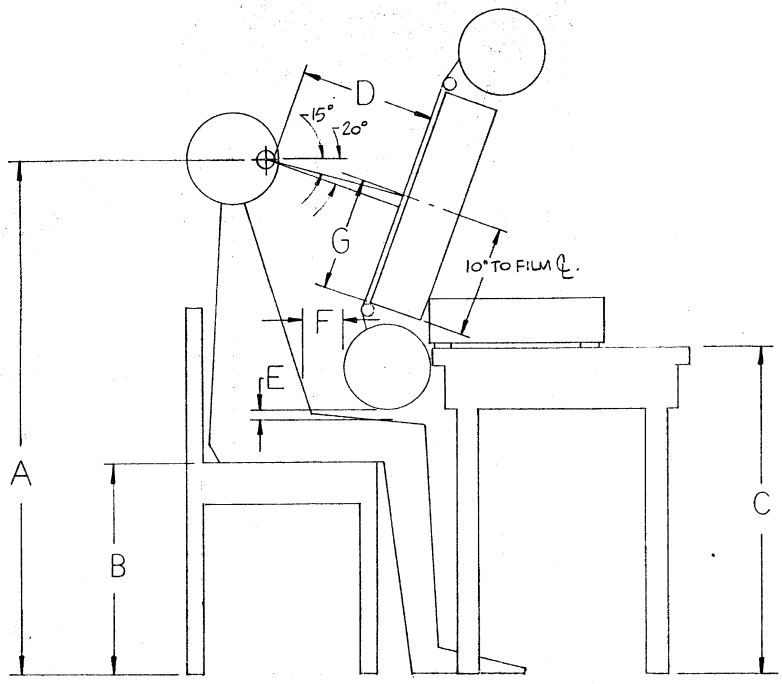
STAT

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9



Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9



LIGHT TABLE SHOWN IN VERTICAL POSITION.

OPERATORS	EYE LEVEL TO FLOOR A	FURNITURE DIMENSIONS CHAIR B	FURNITURE DIMENSIONS DESK C	EYE TO GLASS D	LEG CLEARANCE E	STOMACH CLEARANCE F	EYE LEVEL AT FILM (15°) G
FEMALE 5'-3½"	45"	18"	29"	12"	1½"	5"	11½"
FEMALE 5'-6"	44½"	18"	29"	12"	1½"	6"	10"
FEMALE 5'-9½" [1]	47"	18"	29"	12"	1"	6"	12"
MALE 5'-10½"	45"	18"	29"	12"	1¾"	6"	10½"
MALE 5'-6"	45"	18"	29"	12"	2¼"	6"	10"
MALE 6'-5"	49"	18"	29"	12"	½" [2]	3½"	14"

[1] ILLUSTRATED IN PHOTOGRAPHS WITH 30" DESK.

[2] TO OBTAIN ADDITIONAL LEG CLEARANCE REDUCE CHAIR HEIGHT TO 17".

STAT

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

STAT

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9

Next 2 Page(s) In Document Exempt

Approved For Release 2003/01/28 : CIA-RDP78B04770A002000020028-9